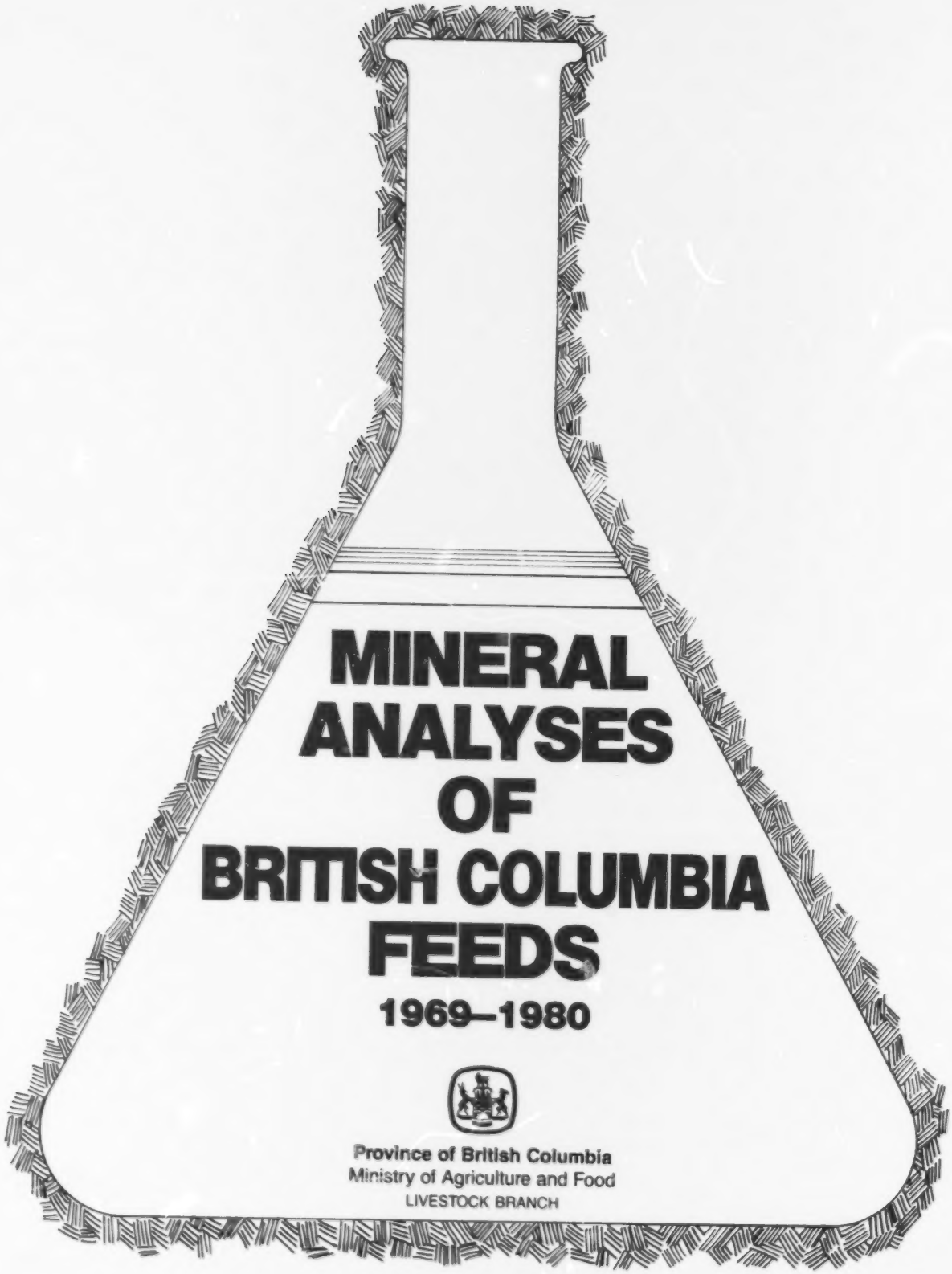

MINERAL ANALYSES OF BRITISH COLUMBIA FEEDS

1969–1980

Province of British Columbia
Ministry of Agriculture and Food
LIVESTOCK BRANCH

MINERAL ANALYSES
OF BRITISH COLUMBIA FEEDS
1969–1980

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Foreword

This publication has been designed to assist the feed industry to better cater to the needs of British Columbia livestock producers, through provision of average mineral analyses of British Columbia farm produced forages. The information should be useful to those designing rations or mineral supplements to more closely approximate the needs of livestock produced in British Columbia.

The publication will be revised at such time as additional significant data becomes available.

The Livestock Branch would be pleased to receive questions, comments and suggestions you may wish to make about this publication.

July 1982

Director,
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Victoria, B.C.,
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Introduction

A feed analysis service offered jointly by Agriculture Canada and the B.C. Cattlemen's Association, was available to farmers and ranchers from 1969 to 1971. Since 1971, such a service has been the responsibility of the B.C. Ministry of Agriculture and Food and is located at the Soil, Feed and Tissue Testing Laboratory, Kelowna.

The aim of the feed advisory service is to determine the nutrient content of feeds used in British Columbia so that recommendations on rations and management, based on the analyses of feeds submitted for testing, can be made available to producers.

This publication should be of particular assistance to feed manufacturers, large-scale livestock producers and others who may need to formulate feeds without the benefit of an analysis of all the ingredients used in a particular batch. Ideally, they would like to have recommendations based on analyses of the feeds to be used, however, since it is not feasible to analyse all feeds, they must rely on average values when formulating and purchasing supplements. This publication supplies the required information on mineral concentrations in roughages and grains used in the province. It contains the summary of mineral analyses of feeds submitted to the feed testing laboratory by farmers and ranchers in B.C. from 1969 to 1980 inclusive. All the data presented is reported on a moisture free (dry) basis.

While the average levels of minerals given in the tables are the most meaningful information in this publication, attention should be given to the ranges and standard deviations (S.D.). Nutritionists will usually formulate mineral supplements using average values and coefficients of variation, unless they have analyses of the specific feeds being used.

All persons using this data should be aware of the wide variations in concentration of some minerals and minimum variations in others within and between areas of the province. Caution should be exercised in using data where very few samples were analysed as trends observed in these cases may not be truly representative of the region.

Some individual samples were eliminated from the data. These are few, and would include samples with additives present, samples which were contaminated and samples which were mislabelled.

The reader will note that while Selenium is listed, most sectors indicate insufficient data is available to supply a figure. This is largely due to the fact that a full service was not available until December 1981. Since this publication lists only results to the end of 1980, these could not be included; they will however, be included in future revisions.

Glossary of Terms

DRY MATTER BASIS

All data in this publication are reported on a dry matter basis. The concentration of a mineral on a dry matter basis is the amount of mineral in the completely dry portion of the feed. Expressing concentration of minerals on this basis allows comparison of feeds of different moisture contents.

HAY

The entire herbage of forage plants harvested and dried to not more than 20% moisture.

I.D.

Insufficient data. No data has been recorded for a feed unless six or more samples were recorded.

MIXED CEREALS

The vast majority of feeds in this category are mixtures of oats and barley. A few may be mixtures of oats and/or barley with other cereals.

SILAGE

Any high moisture crop, including haylage, containing greater than 40% moisture and preserved in a succulent condition by partial fermentation.

STANDARD DEVIATION (S.D.)

A measure of the dispersion of values. Normally 68% of all values fall within plus and minus (±) one standard deviation from the average while 95% of all values fall within ± 2 S.D. Example: the average manganese level in legume hay in the province (table 1, page 7) is 34.5 ppm and the S.D. is 22.4. Therfore, we would say that 68% of the samples of legume hay should contain between 12.1 ppm and 56.9 ppm of manganese (e.g. 34.5 - 22.4 and 34.5 + 22.4).

RANGE

The range represents the maximum and minimum concentration of mineral observed in the samples analysed. Inaccurate identification of samples, contamination with soil or chemicals, loss of leaf material during sampling may contribute to wide ranges observed with certain feeds and individual minerals.

UNSP. GRASS/LEGUME

Unspecified proportions of grass and legumes.

33% GRASS MAXIMUM, 66% GRASS MAXIMUM OR > 66% GRASS

The grass/legume sample contains no more than 33% grass, 66% grass, or has greater than 66% grass respectively. These proportions are those listed by the producer when the sample was submitted to the laboratory. The laboratory has not attempted to verify these proportions.

LEGUMES

This category of feed contains mostly alfalfa. However, a significant proportion of the samples represented by the category will be made up of clovers and other legumes.

PPM

Several of the minerals are reported in parts per million (ppm).

ALFALFA HAY

This category is comprised mostly of alfalfa hay, but also contains dehydrated alfalfa cubes and pellets.

Map of Areas Represented

TABLE 1 AVERAGE MINERAL ANALYSIS **Provincial Summary**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	1254	1265	801	277	772	798	797	9
	average	0.46	0.25	0.19	1.8	8.1	115.8	24.0	0.17
	range	0.07-1.24	0.05-0.62	0.04-0.61	0.3-6.5	1.0-33.0	7.0-868.0	2.0-61.0	0.02-0.69
	S.D.	±0.22	±0.12	±0.07	±0.83	±5.0	±86.2	±8.5	±0.22
Legume									
	no. samples	773	773	504	141	506	495	498	I.D.
	average	1.4	0.25	0.26	2.4	9.7	34.5	23.3	
	range	0.18-3.0	0.04-0.75	0.11-0.69	0.26-6.0	2.0-50.0	8.0-102.0	9.0-92.0	
	S.D.	±0.43	±0.07	±0.07	±0.75	±3.8	±22.4	±12.3	
Grass-Legume (unsp)									
	no. samples	1458	1456	859	331	869	861	865	19
	average	0.93	0.24	0.23	2.05	8.2	63.9	23.0	0.12
	range	0.11-2.44	0.05-0.73	0.01-0.66	0.62-3.85	1.0-55.0	8.0-515.0	7.0-191.0	0.02-0.40
	S.D.	±0.42	±0.08	±0.08	±0.56	±4.18	±50.0	±10.9	±0.10
Grass-Legume (33% grass max)									
	no. samples	162	162	54	28	55	54	55	7
	average	1.13	0.22	0.28	2.07	7.9	40.0	25.0	0.11
(7)	range	0.2-2.09	0.05-0.37	0.09-0.6	0.56-3.03	2.0-22.0	8.0-127.0	14.0-100.0	0.02-0.44
	S.D.	±0.39	±0.06	±0.1	±0.56	±2.9	±20.0	±11.7	±0.001

TABLE 2 AVERAGE MINERAL ANALYSIS **Provincial Summary**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	301	302	90	43	91	91	91	6
	average	0.82	0.20	0.24	2.01	7.7	62.7	25.5	0.07
	range	0.13-1.86	0.06-0.42	0.08-0.51	0.20-3.68	3.0-17.0	10.0-241.0	8.0-104.0	0.02-0.12
	S.D.	±0.33	±0.07	±0.08	±0.74	±2.6	±48.5	±11.7	±0.03
Grass-Legume (>66% grass)									
	no. samples	180	179	84	44	84	84	84	I.D.
	average	0.53	0.19	0.19	1.66	5.9	116.4	26.4	
	range	0.14-1.83	0.07-0.37	0.08-0.41	0.92-3.20	2.0-24.0	20.0-448.0	13.0-62.0	
	S.D.	±0.26	±0.07	±0.08	±0.61	±3.8	±100.3	±8.0	
Alfalfa									
	no. samples	620	620	335	147	337	335	337	14
	average	1.33	0.25	0.27	2.59	9.6	37.2	22.9	0.15
	range	0.31-2.45	0.09-0.49	0.11-0.55	0.91-3.95	5.0-42.0	10.0-94.0	10.0-54.0	0.02-0.84
	S.D.	±0.32	±0.06	±0.08	±0.55	±3.6	±27.8	±5.0	±0.21
Oat									
	no. samples	139	138	76	32	74	71	75	I.D.
	average	0.35	0.25	0.17	2.26	6.7	22.2	23.4	
(8)	range	0.08-1.56	0.02-0.50	0.08-0.42	0.40-5.25	2.0-18.0	6.0-37.0	6.0-61.0	
	S.D.	±0.21	±0.09	±0.07	±1.26	±3.5	±6.4	±8.7	

TABLE 3 AVERAGE MINERAL ANALYSIS **Vancouver Island**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	185	186	102	26	101	101	100	I.D.
	average	0.42	0.26	0.22	1.79	7.2	150.5	23.3	
	range	0.19-0.89	0.10-0.55	0.10-0.61	0.6-6.54	3.0-23.0	26.0-376.0	9.0-60.0	
	S.D.	±0.18	±0.07	±0.07	±1.18	±2.8	±60.8	±6.9	
Legume									
	no. samples	54	54	28	6	26	24	26	I.D.
	average	1.28	0.24	0.26	2.08	10.2	40.1	20.6	
	range	0.44-2.12	0.04-0.37	0.13-0.58	0.40-3.47	5.0-16.0	18.0-74.0	13.0-40.0	
	S.D.	±0.36	±0.06	±0.08	±0.99	±2.7	±34.7	±5.9	
Grass-Legume (unsp)									
	no. samples	76	76	58	10	58	58	56	7
	average	0.52	0.27	0.22	1.89	7.6	140.5	22.4	0.08
	range	0.27-1.48	0.11-0.43	0.09-0.37	1.10-3.25	1.0-16.0	46.0-332.0	16.0-30.0	0.02-0.14
	S.D.	±0.23	±0.07	±0.06	±0.68	±3.6	±62.4	±3.3	±0.04
Grass-Legume (33% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 4 AVERAGE MINERAL ANALYSIS **Vancouver Island**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)		I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	no. samples								
	average								
	range								
	S.D.								
Grass-Legume (>66% grass)									
	no. samples	12	12	8	I.D.	8	8	8	I.D.
	average	0.46	0.27	0.20		7.1	128.6	22.6	
	range	0.39-0.55	0.15-0.36	0.14-0.29		5.0-9.0	75.0-210.0	20.0-27.0	
	S.D.	±0.06	±0.06	±0.05		±1.5	±49.0	+2.1	
Alfalfa									
	no. samples	34	34	14	8	14	14	14	I.D.
	average	1.16	0.22	0.27	2.29	8.5	27.9	21.9	
	range	0.43-1.99	0.15-0.30	0.15-0.42	0.91-3.40	7.0-11.0	18.0-40.0	10.0-35.0	
	S.D.	±0.37	±0.04	±0.08	±0.74	±1.4	±6.3	±5.7	
Oat									
	no. samples								
	average	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
(10)	range								
	S.D.								

TABLE 5 AVERAGE MINERAL ANALYSIS **Fraser Valley**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	554	558	433	128	426	427	427	I.D.
	average	0.46	0.29	0.19	2.02	9.2	107.6	24.7	
	range	0.13-1.21	0.10-0.59	0.07-0.38	0.61-5.85	2.0-29.0	16.0-411.0	10.0-44.0	
	S.D.	±0.18	±0.08	±0.06	±0.78	±4.6	±43.9	±7.7	
Legume									
	no. samples	222	223	178	22	176	173	173	I.D.
	average	1.42	0.26	0.27	2.41	10.3	36.4	21.0	
	range	0.31-2.80	0.12-0.75	0.11-0.41	1.11-3.56	3.0-50.0	11.0-89.0	11.0-92.0	
	S.D.	±0.47	±0.07	±0.06	±0.48	±4.4	±27.9	±9.6	
Grass-Legume (unsp)									
	no. samples	177	177	131	33	133	131	132	I.D.
	average	0.65	0.29	0.22	2.35	8.2	97.3	22.2	
	range	0.11-1.82	0.10-0.44	0.01-0.49	1.03-3.29	2.0-35.0	15.0-225.0	9.0-79.0	
	S.D.	±0.32	±0.07	±0.06	±0.55	±3.8	±46.5	±7.4	
Grass-Legume (33% grass max)									
	no. samples	6	6	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.65	0.22						
(11)	range	0.32-2.08	0.05-0.30						
	S.D.	±0.66	±0.09						

TABLE 6 AVERAGE MINERAL ANALYSIS Fraser Valley

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	14	14	10	9	10	10	10	I.D.
	average	0.51	0.29	0.19	2.49	8.9	149.5	27.2	
	range	0.27-1.19	0.14-0.42	0.15-0.24	1.50-3.68	6.0-13.0	59.0-241.0	19.0-36.0	
	S.D.	±0.25	±0.07	±0.02	±0.67	±1.9	±69.6	±4.5	
Grass-Legume (>66% grass)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Alfalfa									
	no. samples	250	250	182	66	182	181	182	7
	average	1.34	0.25	0.27	2.62	9.2	36.7	22.4	0.10
	range	0.31-2.34	0.13-0.36	0.16-0.49	1.18-3.81	5.0-16.0	13.0-83.0	13.0-45.0	0.02-0.21
	S.D.	±0.28	±0.05	±0.05	±0.52	±2.0	±34.7	±5.1	±0.08
Oat									
	no. samples	30	30	17	I.D.	14	14	15	I.D.
	average	0.32	0.24	0.15		5.6	68.8	22.9	
(12)	range	0.08-0.95	0.05-0.41	0.10-0.25		3.0-12.0	39.0-169.0	14.0-36.0	
	S.D.	±0.16	±0.08	±0.04		±2.7	±32.8	±7.7	

TABLE 7 AVERAGE MINERAL ANALYSIS **Kamloops-Okanagan**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	159	160	77	28	77	77	78	I.D.
	average	0.47	0.17	0.24	1.31	6.4	107.6	18.9	
	range	0.07-1.21	0.05-0.62	0.04-0.56	0.30-2.18	1.0-17.0	14.0-757.0	5.0-40.0	
	S.D.	±0.29	0.07	±0.09	±0.54	±3.9	±118.9	±7.3	
Legume									
	no. samples	63	63	43	12	43	43	42	I.D.
	average	1.33	0.24	0.30	2.07	10.02	33.2	19.5	
	range	0.42-2.05	0.14-0.48	0.14-0.63	0.84-3.06	4.0-36.0	12.0-73.0	9.0-55.0	
	S.D.	±0.34	±0.06	±0.09	±0.66	±5.3	±11.4	±7.1	
Grass-Legume (unsp)									
	no. samples	302	302	193	78	199	193	200	I.D.
	average	0.95	0.23	0.24	2.09	8.4	44.7	19.1	
	range	0.22-2.17	0.08-0.60	0.02-0.66	0.72-3.85	2.0-31.0	18.0-195.0	7.0-191.0	
	S.D.	±0.41	±0.07	±0.09	±0.55	±3.9	±24.2	±14.4	
Grass-Legume (33% grass max)									
	no. samples	32	32	8	I.D.	8	8	8	I.D.
	average	1.13	0.26	0.29		10.6	33.4	19.9	
(13)	range	0.20-2.04	0.16-0.37	0.25-0.34		5.0-22.0	23.0-48.0	17.0-25.0	
	S.D.	±0.41	±0.05	±0.03		±4.9	±8.1	±3.0	

TABLE 8 AVERAGE MINERAL ANALYSIS Kamloops-Okanagan

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	79	79	13	I.D.	13	13	13	I.D.
	average	0.87	0.21	0.25		7.3	39.2	16.8	
	range	0.30-1.61	0.06-0.38	0.17-0.32		4.0-12.0	13.0-78.0	8.0-24.0	
	S.D.	±0.29	±0.07	±0.04		±2.1	±18.3	±3.8	
Grass-Legume (>66% grass)									
	no. samples	14	14	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.65	0.19						
	range	0.37-1.32	0.13-0.30						
	S.D.	±0.28	±0.05						
Alfalfa									
	no. samples	54	54	22	6	23	23	23	I.D.
	average	1.43	0.25	0.37	2.19	16.3	40.6	22.3	
	range	0.54-2.24	0.13-0.37	0.19-0.55	1.84-2.52	7.0-42.0	20.0-68.0	12.0-49.0	
	S.D.	±0.39	±0.05	±0.14	±0.23	±9.3	±12.5	±8.2	
Oat									
	no. samples	21	21	10	I.D.	11	10	11	I.D.
	average	0.42	0.24	0.22		8.3	60.4	21.0	
(14)	range	0.20-1.56	0.09-0.42	0.11-0.33		4.0-18.0	31.0-117.0	16.0-26.0	
	S.D.	±0.29	±0.08	±0.08		±4.3	±24.0	±3.8	

TABLE 9 AVERAGE MINERAL ANALYSIS **Kootenay**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	112	116	54	31	54	54	54	I.D.
	average	0.59	0.24	0.18	2.13	6.7	68.8	21.2	
	range	0.09-1.24	0.05-0.52	0.08-0.40	0.34-3.91	2.0-18.0	7.0-243.0	8.0-51.0	
	S.D.	±0.32	±0.09	±0.07	±0.98	±3.37	±54.2	±7.3	
Legume									
	no. samples	295	296	191	92	193	190	191	I.D.
	average	1.43	0.27	0.25	2.57	8.9	31.1	22.9	
	range	0.23-3.00	0.09-0.48	0.11-0.65	0.84-5.95	2.0-23.0	9.0-81.0	13.0-88.0	
	S.D.	±0.38	±0.06	±0.08	±0.74	±2.9	±16.8	±7.9	
Grass-Legume (unsp)									
	no. samples	399	399	227	103	227	227	226	9
	average	1.08	0.26	0.23	2.18	8.8	37.4	22.6	0.11
	range	0.17-2.37	0.11-0.73	0.07-0.50	0.88-3.40	2.0-28.0	8.0-121.0	12.0-161.0	0.02-0.31
	S.D.	±0.39	±0.07	±0.07	±0.55	±3.5	±16.5	±11.8	±0.10
Grass-Legume (33% grass max)									
	no. samples	44	44	27	11	28	27	28	7
	average	1.22	0.26	0.29	2.26	8.3	41.6	24.8	0.11
(15)	range	0.67-1.93	0.13-0.36	0.15-0.60	1.63-3.02	5.0-15.0	14.0-111.0	14.0-100.0	0.02-0.44
	S.D.	±0.23	±0.05	±0.12	±0.45	±2.1	±17.9	±15.2	±0.15

TABLE 10 AVERAGE MINERAL ANALYSIS **Kootenay**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	52	52	30	17	31	31	31	I.D.
	average	1.02	0.26	0.29	2.06	8.6	49.4	24.6	
	range	0.13-1.74	0.12-0.42	0.14-0.51	0.20-3.41	4.0-17.0	20.0-197.0	10.0-104.0	
	S.D.	±0.32	±0.06	±0.10	±0.87	±2.7	±35.4	±15.6	
Grass-Legume (>66% grass)									
	no. samples	18	18	7	7	7	7	7	I.D.
	average	0.74	0.21	0.26	1.36	10.0	46.6	20.3	
	range	0.30-1.83	0.14-0.28	0.11-0.41	0.93-2.02	4.0-23.0	20.0-79.0	13.0-27.0	
	S.D.	±0.38	±0.04	±0.13	±0.39	±6.7	±23.6	±5.1	
Alfalfa									
	no. samples	241	241	108	61	109	108	109	6
	average	1.31	0.25	0.26	2.69	9.1	39.1	23.9	0.22
	range	0.62-2.45	0.12-0.49	0.11-0.43	1.24-3.95	5.0-16.0	10.0-94.0	13.0-54.0	0.02-0.84
	S.D.	±0.33	±0.06	±0.08	±0.55	±2.2	±17.9	±6.1	±0.32
Oat									
	no. samples	47	46	31	18	31	29	31	I.D.
	average	0.40	0.29	0.17	2.68	7.2	49.6	23.2	
(16)	range	0.18-1.32	0.10-0.50	0.08-0.42	0.90-5.25	2.0-16.0	12.0 89.0	6.0-61.0	
	S.D.	±0.23	±0.09	±0.08	±1.41	±3.5	±21.4	±10.0	

TABLE 11 AVERAGE MINERAL ANALYSIS **Central Interior**

HAY		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	207	208	127	63	129	131	130	I.D.
	average	0.41	0.18	0.18	1.36	6.8	132.9	25.5	
	range	0.07-1.07	0.06-0.39	0.04-0.51	0.35-2.35	1.0-33.0	15.0-749.0	2.0-52.0	
	S.D.	±0.19	±0.15	±0.09	±0.49	±7.3	±140.3	±10.8	
Legume									
	no. samples	42	42	23	I.D.	24	24	24	I.D.
	average	1.53	0.23	0.33		9.6	47.8	32.7	
	range	0.33-2.96	0.12-0.53	0.11-0.69		4.0-16.0	20.0-101.0	19.0-57.0	
	S.D.	±0.58	±0.07	±0.14		±3.8	±22.9	±10.5	
Grass-Legume (unsp)									
	no. samples	367	365	197	79	199	199	199	I.D.
	average	0.72	0.19	0.23	1.77	7.7	68.9	25.5	
	range	0.13-2.44	0.05-0.38	0.07-0.62	0.62-3.29	2.0-56.0	16.0-515.0	15.0-44.0	
	S.D.	±0.37	±0.07	±0.09	±0.51	±5.3	±58.1	±5.9	
Grass-Legume (33% grass max)									
	no. samples	44	44	6	I.D.	6	6	6	I.D.
	average	1.02	0.21	0.24		5.0	61.5	25.3	
(17)	range	0.33-1.75	0.14-0.32	0.14-0.46		3.0-7.0	21.0-127.0	19.0-36.0	
	S.D.	±0.35	±0.05	±0.11		±1.4	±36.4	±6.7	

TABLE 12 AVERAGE MINERAL ANALYSIS **Central Interior**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	119	120	32	12	32	32	32	I.D.
	average	0.75	0.19	0.22	1.77	6.8	61.0	29.6	
	range	0.25-1.51	0.06-0.38	0.09-0.34	1.27-2.51	4.0-14.0	24.0-161.0	17.0-56.0	
	S.D.	±0.26	±0.05	±0.07	±0.36	±2.3	±32.3	±9.8	
Grass-Legume (>66% grass)									
	no. samples	113	112	56	29	56	56	56	I.D.
	average	0.50	0.17	0.19	1.62	5.4	132.1	27.9	
	range	0.14-1.57	0.07-0.37	0.08-0.41	0.92-2.60	2.0-24.0	32.0-448.0	13.0-62.0	
	S.D.	±0.23	±0.08	±0.08	±0.48	±3.6	±112.6	±8.4	
Alfalfa									
	no. samples	16	16	7	I.D.	7	7	7	I.D.
	average	1.45	0.23	0.30		8.0	34.0	22.9	
	range	0.85-2.18	0.13-0.34	0.24-0.39		6.0-10.0	28.0-42.0	12.0-32.0	
	S.D.	±0.42	±0.05	±0.06		±2.0	±4.4	±7.9	
Oat									
	no. samples	13	13	10		10	10	10	I.D.
	average	0.27	0.25	0.15	I.D.	6.1	57.7	27.1	
(18)	range	0.08-0.56	0.18-0.32	0.11-0.23		3.0-13.0	25.0-100.0	17.0-50.0	
	S.D.	±0.11	±0.04	±0.04		±3.8	±22.6	±9.8	

TABLE 13 AVERAGE MINERAL ANALYSIS **Peace River**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	37	37	8	I.D.	8	8	8	I.D.
	average	0.44	0.16	0.18		6.8	229.1	37.5	
	range	0.21-1.12	0.10-0.27	0.11-0.31		4.0-10.0	23.0-868.0	16.0-59.0	
	S.D.	±0.19	±0.04	±0.06		±2.3	±275.9	±13.3	
Legume									
	no. samples	97	95	41	I.D.	44	41	42	I.D.
	average	1.34	0.21	0.29		10.2	32.5	35.1	
	range	0.18-2.68	0.11-0.35	0.16-0.43		4.0-23.0	8.0-53.0	18.0-52.0	
	S.D.	±0.47	±0.05	±0.06		±3.2	±11.7	±27.4	
Grass-Legume (unsp)									
	no. samples	137	137	53	28	53	53	52	I.D.
	average	0.98	0.20	0.25	1.90	7.8	62.3	32.9	
	range	0.33-2.34	0.08-0.50	0.10-0.42	1.01-2.58	1.0-24.0	11.0-208.0	20.0-83.0	
	S.D.	±0.42	±0.06	±0.07	±0.39	±3.9	±41.2	±9.8	
Grass-Legume (33% grass max)									
	no. samples	36	36	11	8	11	11	11	I.D.
	average	1.09	0.19	0.28	1.61	7.5	34.7	30.2	
	range	0.45-2.09	0.07-0.37	0.13-0.41	0.56-2.11	5.0-9.0	15.0-55.0	21.0-36.0	
	S.D.	±0.44	±0.06	±0.09	±0.49	±1.3	±10.9	±4.9	

TABLE 14 AVERAGE MINERAL ANALYSIS **Peace River**

HAY cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	36	36	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.86	0.17						
	range	0.23-1.86	0.06-0.27						
	S.D.	±0.45	±0.05						
Grass-Legume (>66% grass)									
	no. samples	19	19	8	I.D.	8	8	8	I.D.
	average	0.45	0.16	0.16		4.3	58.3	26.1	
	range	0.18-1.06	0.10-0.27	0.08-0.31		3.0-7.0	42.0-77.0	19.0-36.0	
	S.D.	±0.25	±0.05	±0.08		±1.69	±13.5	±6.5	
Alfalfa									
	no. samples	25	25		I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.42	0.19						
	range	0.70-2.01	0.09-0.28						
	S.D.	±0.33	±0.05						
Oat									
	no. samples	25	25	6	I.D.	6	6	6	I.D.
	average	0.29	0.21	0.16		4.7	61.0	26.2	
(20)	range	0.08-0.77	0.03-0.36	0.10-0.21		3.0-11.0	27.0-96.0	16.0-37.0	
	S.D.	±0.13	±0.09	±0.05		±3.2	±28.5	±8.2	

TABLE 15 AVERAGE MINERAL ANALYSIS **Provincial Summary**

SILAGE		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	547	558	365	102	367	366	365	I.D.
	average	0.53	0.03	0.20	2.52	9.9	125.3	33.0	
	range	0.11-1.23	0.09-0.58	0.08-0.83	0.27-5.8	1.0-63.0	14.0-620.0	9.0-340.0	
	S.D.	±0.19	±0.08	±0.07	±0.91	±5.1	±65.5	±26.9	
Legume									
	no. samples	67	67	39	14	39	39	39	I.D.
	average	1.38	0.29	0.28	2.35	10.9	53.9	27.6	
	range	0.21-2.49	0.11-0.46	0.1-0.59	1.20-3.01	3.0-34.0	12.0-132.0	7.0-62.0	
	S.D.	±0.52	±0.07	±0.11	±0.51	±5.4	±25.5	±8.9	
Grass-Legume (unsp)									
	no. samples	380	376	207	69	214	210	209	I.D.
	average	0.86	0.27	0.24	2.0	9.4	90.9	27.8	
	range	0.05-2.32	0.09-1.05	0.02-0.56	0.38-3.38	3.0-44.0	12.0-268.0	10.0-63.0	
	S.D.	±0.39	±0.09	±0.09	±0.59	±4.7	±53.9	±7.8	
Grass-Legume (33% grass max)									
	no. samples	38	39	10	I.D.	10	10	10	I.D.
	average	1.25	0.26	0.26		9.0	43.0	28.0	
	range	0.31-2.14	0.15-0.38	0.15-0.32		6.0-15.0	29.0-69.0	12.0-50.0	
	S.D.	±0.39	±0.07	±0.06		±2.5	±12.5	±9.7	

TABLE 16 AVERAGE MINERAL ANALYSIS **Provincial Summary**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	93	92	32	8	32	32	32	I.D.
	average	0.96	0.23	0.23	2.15	8.0	76.0	31.1	
	range	0.33-1.88	0.09-0.44	0.12-0.37	1.74-2.48	4.0-19.0	28.0-182.0	20.0-61.0	
	S.D.	±0.37	±0.07	±0.06	±0.27	±2.8	±36.4	±9.4	
Grass-Legume (>66% grass)									
	no. samples	43	43	12	I.D.	12	12	12	I.D.
	average	0.63	0.25	0.23		8.9	151.0	28.3	
	range	0.21-1.15	0.10-0.43	0.14-0.34		4.0-17.0	66.0-274.0	20.0-41.0	
	S.D.	±0.25	±0.08	±0.06		±4.5	±72.3	±5.5	
Alfalfa									
	no. samples	58	58	30	18	20	31	31	I.D.
	average	1.47	0.28	0.29	2.85	9.9	50.4	25.9	
	range	0.64-2.30	0.13-0.40	0.13-0.80	145-4.78	4.0-20.0	15.0-104.0	17.0-41.0	
	S.D.	±0.33	±0.06	±0.12	±0.69	±3.2	±25.1	±5.4	
Oat									
	no. samples	93	97	56	27	56	56	56	I.D.
	average	0.37	0.26	0.18	1.76	6.7	78.3	27.5	
	range	0.11-0.81	0.08-0.54	0.06-0.32	0.67-2.85	1.0-23.0	11.0-208.0	11.0-56.0	
	S.D.	±0.16	±0.09	±0.06	±0.60	±4.3	±44.8	±9.5	

TABLE 17 AVERAGE MINERAL ANALYSIS **Provincial Summary**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	64	66	37	21	37	37	37	I.D.
	average	0.41	0.29	0.20	1.76	7.9	59.8	33.5	
	range	0.12-0.80	0.16-0.50	0.07-0.31	0.69-2.82	2.0-33.0	13.0-178.0	14.0-73.0	
	S.D.	±0.16	±0.07	±0.05	±0.59	±5.6	±38.1	±11.6	
Corn									
	no. samples	853	891	461	162	471	465	470	I.D.
	average	0.29	0.23	0.18	1.19	7.9	53.1	33.4	
	range	0.05-0.90	0.06-0.72	0.04-0.38	0.57-1.86	2.0-88.0	4.0-304.0	9.0-348.0	
	S.D.	±0.12	±0.06	±0.05	±0.28	±6.1	±33.1	±30.5	
Mixed Cereals									
	no. samples	102	101	40	17	42	42	42	I.D.
	average	0.41	0.25	0.18	1.68	6.9	70.0	31.2	
	range	0.05-1.09	0.08-0.46	0.09-0.29	0.78-3.45	1.0-19.0	15.0-189.0	11.0-91.0	
	S.D.	±0.18	±0.06	±0.05	±0.73	±4.0	±33.4	±13.6	

TABLE 18 AVERAGE MINERAL ANALYSIS **Vancouver Island**

SILAGE		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	140	141	95	29	94	94	93	I.D.
	average	0.49	0.31	0.22	2.39	8.9	160.7	29.9	
	range	0.20-1.22	0.09-0.55	0.14-0.38	0.96-4.2	5.0-15.0	26.0-400.0	11.0-69.0	
	S.D.	±0.16	±0.07	±0.05	±0.77	±2.7	±56.3	±7.3	
Legume									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (unsp)									
	no. samples	58	57	46	9	46	45	45	I.D.
	average	0.58	0.32	0.24	1.73	9.1	141.7	29.5	
	range	0.05-1.28	0.16-0.55	0.13-0.47	0.38-2.60	3.0-19.0	24.0-268.0	14.0-59.0	
	S.D.	±0.23	±0.07	±0.08	±0.75	±3.4	±59.9	±9.4	
Grass-Legume (33% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
(24)	range								
	S.D.								

TABLE 19 AVERAGE MINERAL ANALYSIS Vancouver Island

		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
SILAGE cont'd									
Grass-Legume (66% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (>66% grass)									
	no. samples	10	10	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.51	0.30						
	range	0.27-0.71	0.25-0.40						
	S.D.	±0.13	±0.05						
Alfalfa									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Oat									
	no. samples	6	6	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.42	0.27						
(25)	range	0.25-0.75	0.20-0.31						
	S.D.	±0.18	±0.04						

TABLE 20 AVERAGE MINERAL ANALYSIS **Vancouver Island**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Corn									
	no. samples	61	61	40	18	40	40.	40	I.D.
	average	0.32	0.24	0.21	1.26	6.6	79.7	28.2	
	range	0.13-0.70	0.08-0.42	0.05-0.35	0.57-1.83	2.0-15.0	26.0-193.0	10.0-56.0	
	S.D.	±0.09	±0.08	±0.06	±0.36	±2.9	±30.6	±10.5	
Mixed Cereals									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 21 AVERAGE MINERAL ANALYSIS **Fraser Valley**

SILAGE		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	327	330	243	60	246	245	245	I.D.
	average	0.51	0.32	0.19	2.70	10.5	116.1	34.9	
	range	0.11-1.22	0.12-0.58	0.08-0.43	1.05-5.8	1.0-63.0	14.0-620.0	9.0-340.0	
	S.D.	±0.17	±0.07	±0.06	±0.84	±5.8	±63.6	±32.4	
Legume									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (unsp)									
	no. samples	60	59	35	14	39.0	36	38	I.D.
	average	0.63	0.33	0.19	2.50	10.7	114.8	26.9	
	range	0.26-1.79	0.18-1.05	0.02-0.37	0.99-3.35	4.0-24.0	32.0-258.0	16.0-63.0	
	S.D.	±0.27	±0.13	±0.06	±0.61	±4.6	±51.1	±7.9	
Grass-Legume (33% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
(27)	range								
	S.D.								

TABLE 22 AVERAGE MINERAL ANALYSIS Fraser Valley

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (>66% grass)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Alfalfa									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Oat									
	no. samples	11	11	9	I.D.	9	9	9	I.D.
	average	0.39	0.29	0.19		8.8	102.2	33.1	
(28)	range	0.27-0.55	0.16-0.41	0.13-0.29		5.0-22.0	11.0-208.0	19.0-56.0	
	S.D.	±0.09	±0.08	±0.05		±5.2	±61.8	±12.5	

TABLE 23 AVERAGE MINERAL ANALYSIS Fraser Valley

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Corn									
	no. samples	457	457	260	81	263	261	262	I.D.
	average	0.27	0.22	0.17	1.19	8.8	55.1	34.1	
	range	0.05-0.90	0.06-0.72	0.07-0.34	0.68-1.83	2.0-88.0	4.0-245.0	14.0-348.0	
	S.D.	±0.11	±0.07	±0.05	±0.27	±7.3	±30.8	±25.2	
Mixed Cereals									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 24 AVERAGE MINERAL ANALYSIS Kamloops-Okanagan

SILAGE		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	15	15	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.50	0.21						
	range	0.28-1.02	0.12-0.31						
	S.D.	±0.18	±0.06						
Legume									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (unsp)									
	no. samples	27	27	8	I.D.	9	9	8	I.D.
	average	0.93	0.26	0.37		11.8	61.3	25.3	
	range	0.30-1.64	0.09-0.52	0.20-0.52		4.0-20.0	33.0-100.0	15.0-41.0	
	S.D.	±0.35	±0.09	±0.13		±5.6	±21.2	±8.4	
Grass-Legume (33% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 25 AVERAGE MINERAL ANALYSIS **Kamloops-Okanagan**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	8	8	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.15	0.29						
	range	0.56-1.88	0.18-0.42						
	S.D.	±0.48	±0.07						
Grass-Legume (>66% grass)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Alfalfa									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Oat									
	no. samples	15	16	10	6	10	10	10	I.D.
	average	0.36	0.22	0.18	1.72	6.2	60.2	24.4	
(31)	range	0.15-0.79	0.12-0.33	0.11-0.32	1.35-2.24	1.0-14.0	35.0-84.0	11.0-34.0	
	S.D.	±0.17	±0.06	±0.07	±0.36	±4.1	±14.5	±6.8	

TABLE 26 AVERAGE MINERAL ANALYSIS **Kamloops-Okananagan**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Corn									
	no. samples	55	55	32	11	33	32	33	I.D.
	average	0.29	0.25	0.24	1.22	7.4	42.4	22.4	
	range	0.10-0.85	0.12-0.39	0.11-0.37	0.73-1.72	3.0-25.0	18.0-170.0	11.0-74.0	
	S.D.	±0.15	±0.06	±0.07	±0.31	±4.6	±27.2	±12.2	
Mixed Cereals									
	no. samples	10	10	6	I.D.	6	6	6	I.D.
	average	0.50	0.30	0.33		5.0	57.8	21.8	
	range	0.27-0.84	0.17-0.46	0.19-0.73		3.0-6.0	38.0-81.0	18.0-26.0	
	S.D.	±0.20	±0.09	±0.20		±1.3	±18.9	±2.6	

TABLE 27 AVERAGE MINERAL ANALYSIS Kootenay

		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
SILAGE									
Grass									
	no. samples	45	51	13	5	13	13	13	I.D.
	average	0.76	0.32	0.20	2.89	9.4	57.7	27.8	
	range	0.33-1.23	0.15-0.45	0.12-0.31	1.12-4.64	2.0-16.0	19.0-82.0	11.0-35.0	
	S.D.	±0.24	±0.06	±0.06	±1.26	±3.9	±17.1	±6.4	
Legume									
	no. samples	36	36	23	9	23	23	23	I.D.
	average	1.38	0.32	0.25	2.61	11.6	54.8	28.6	
	range	0.40-2.49	0.18-0.46	0.10-0.43	2.24-3.01	6.0-34.0	12.0-132.0	7.0-62.0	
	S.D.	±0.45	±0.06	±0.07	±0.29	±6.4	±26.5	±10.5	
Grass-Legume (unsp)									
	no. samples	86	86	46	12	47	47	47	I.D.
	average	1.15	0.30	0.26	2.19	9.1	55.4	25.9	
	range	0.21-2.32	0.12-0.55	0.12-0.43	1.44-3.38	5.0-23.0	12.0-140.0	16.0-42.0	
	S.D.	±0.38	±0.07	±0.07	±0.54	±3.5	±26.4	±5.8	
Grass-Legume (33% grass max)									
	no. samples	13	13	6	I.D.	6	6	6	I.D.
	average	1.29	0.32	0.22		9.5	46.5	25.7	
(33)	range	0.40-2.14	0.21-0.38	0.15-0.30		7.0-15.0	29.0-69.0	12.0-33.0	
	S.D.	±0.43	±0.05	±0.05		±3.0	±14.9	±7.7	

TABLE 28 AVERAGE MINERAL ANALYSIS **Kootenay**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	15	14	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.15	0.30						
	range	0.40-1.66	0.20-0.44						
	S.D.	±0.38	±0.06						
Grass-Legume (>66% grass)									
	no. samples	13	13	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.78	0.29						
	range	0.51-1.15	0.19-0.43						
	S.D.	±0.21	±0.07						
Alfalfa									
	no. samples	45	45	25	18	26	26	26	I.D.
	average	1.44	0.29	0.27	2.85	9.9	52.1	26.5	
	range	0-64-2.21	0.17-0.40	0.18-0.39	1.45-4.78	4.0-20.0	15.0-104.0	17.0-41.0	
	S.D.	±0.34	±0.05	±0.06	±0.69	±3.3	±26.8	±5.7	
Oat									
	no. samples	12	12	8	I.D.	8	8	8	I.D.
	average	0.49	0.36	0.19		7.3	49.9	30.0	
(34)	range	0.11-0.81	0.25-0.54	0.14-0.28		2.0-23.0	22.0-93.0	15.0-51.0	
	S.D.	±0.21	±0.09	±0.05		±6.9	±25.1	±14.3	

TABLE 29 AVERAGE MINERAL ANALYSIS Kootenay

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	12	12	8	I.D.	8	8	8	I.D.
	average	0.46	0.34	0.18		7.5	33.1	30.5	
	range	0.17-0.73	0.16-0.43	0.12-0.29		2.0-13.0	13.0-67.0	14.0-41.0	
	S.D.	±0.18	±0.08	±0.06		±3.1	±16.6	±8.8	
Corn									
	no. samples	308	308	123	50	128	125	128	I.D.
	average	0.30	0.25	0.18	1.16	6.9	41.1	36.8	
	range	0.10-0.98	0.11-0.45	0.04-0.31	0.61-1.85	2.0-21.0	15.0-304.0	9.0-299.0	
	S.D.	±0.09	±0.05	±0.05	+0.27	±3.9	±29.6	±44.7	
Mixed Cereals									
	no. samples	11	10	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.52	0.30						
	range	0.05-1.09	0.20-0.39						
	S.D.	±0.29	±0.07						

TABLE 30 AVERAGE MINERAL ANALYSIS **Central Interior**

SILAGE		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass									
	no. samples	19	20	10	6	10	10	10	I.D.
	average	0.59	0.19	0.31	0.99	6.1	104.5	27.4	
	range	0.32-0.94	0.10-0.25	0.13-0.83	0.27-1.73	1.0-15.0	24.0-228	15.0-35.0	
	S.D.	±0.20	±0.05	±0.21	±0.65	±4.1	±72.4	±5.5	
Legume									
	no. samples	7	7	6	I.D.	6	6	6	I.D.
	average	1.85	0.29	0.37		9.7	71.7	27.7	
	range	1.24-2.37	0.22-0.36	0.21-0.56		7.0-12.0	43.0-112.0	20.0-35.0	
	S.D.	±0.50	±0.05	±0.14		±2.1	±28.5	±5.1	
Grass-Legume (unsp)									
	no. samples	136	134	71	29	72	72	70	I.D.
	average	0.85	0.21	0.25	1.72	8.6	73.7	28.5	
	range	0.28-2.26	0.11-0.36	0.07-0.56	1.14-2.72	4.0-44.0	15.0-175.0	10.0-53.0	
	S.D.	±0.39	±0.06	±0.11	±0.38	±5.9	±36.8	±7.4	
Grass-Legume (33% grass max)									
	no. samples	19	21	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.23	0.22						
	range	0.31-1.98	0.15-0.29						
	S.D.	±0.42	±0.05						

TABLE 31 AVERAGE MINERAL ANALYSIS Central Interior

		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
SILAGE cont'd									
Grass-Legume(66%grass max)									
	no. samples	65	65	23	8	23	23	23	I.D.
	average	0.92	0.21	0.23	2.15	8.5	83.2	31.9	
	range	0.33-1.80	0.09-0.37	0.13-0.37	1.74-2.48	4.0-19.0	30.-182.0	22.0-61.0	
	S.D.	±0.34	±0.06	±0.06	±0.27	±3.1	±39.8	±9.9	
Grass-Legume(>66% grass)									
	no. samples	14	14	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.54	0.17						
	range	0.21-1.00	0.10-0.36						
	S.D.	±0.26	±0.07						
Alfalfa									
	no. samples	7	7	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.63	0.22						
	range	1.06-2.30	0.13-0.29						
	S.D.	±0.39	±0.06						
Oat									
	no. samples	37	40	20	14	20	20	20	I.D.
	average	0.34	0.25	0.18	1.64	5.3	70.1	25.6	
	range	0.12-0.77	0.08-0.50	0.06-0.32	0.82-2.51	2.0-14.0	22.0-163.0	13.0-42.0	
	S.D.	±0.14	±0.08	±0.06	±0.49	±3.0	±30.8	±7.8	

TABLE 32 AVERAGE MINERAL ANALYSIS **Central Interior**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	35	37	20	12	20	20	20	I.D.
	average	0.42	0.27	0.20	1.61	7.3	70.0	34.9	
	range	0.16-0.78	0.16-0.37	0.07-0.31	0.99-2.30	2.0-20.0	21.0-125.0	18.0-73.0	
	S.D.	±0.16	±0.05	±0.05	±0.46	±4.5	±36.3	±12.9	
Corn									
	no. samples	10	10	6	I.D.	7	7	7	I.D.
	average	0.46	0.22	0.26		7.1	90.3	27.3	
	range	0.21-0.87	0.14-0.26	0.17-0.38		2.0-15.0	30.0-200.0	15.0-39.0	
	S.D.	±0.24	±0.03	±0.07		±4.1	±73.4	±8.2	
Mixed Cereals									
	no. samples	65	65	27	10	28	28	28	I.D.
	average	0.39	0.23	0.18	1.65	6.8	76.6	34.0	
	range	0.13-0.98	0.08-0.33	0.09-0.28	0.78-3.45	1.0-16.0	35.0-189.0	15.0-91.0	
	S.D.	±0.16	±0.05	±0.05	±0.87	±3.7	±34.7	±14.7	

TABLE 33 AVERAGE MINERAL ANALYSIS **Peace River**

		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
SILAGE									
Grass									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Legume									
	no. samples	14	14	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.41	0.23						
	range	0.91-2.09	0.11-0.35						
	S.D.	±0.35	±0.06						
Grass-Legume (unsp)									
	no. samples	13	13	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	1.10	0.20						
	range	0.68-1.39	0.13-0.32						
	S.D.	±0.21	±0.05						
Grass-Legume (33% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
(39)	range								
	S.D.								

TABLE 34 AVERAGE MINERAL ANALYSIS **Peace River**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Grass-Legume (66% grass max)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Grass-Legume (>66% grass)									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Alfalfa									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Oat									
	no. samples	12	12	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.32	0.25						
(40)	range	0.20-0.54	0.17-0.33						
	S.D.	±0.11	±0.05						

TABLE 35 AVERAGE MINERAL ANALYSIS **Peace River**

SILAGE cont'd		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	11	11	6	I.D.	6	6	6	I.D.
	average	0.34	0.26	0.19		11.0	40.3	37.8	
	range	0.12-0.61	0.20-0.36	0.12-0.27		5.0-33.0	23.0-63.0	20.0-45.0	
	S.D.	±0.13	±0.05	±0.05		±10.8	+15.9	±9.3	
Corn									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Mixed Cereals									
	no. samples	13	13	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.35	0.24						
	range	0.15-0.56	0.16-0.30						
	S.D.	±0.10	±0.05						

TABLE 36 AVERAGE MINERAL ANALYSIS **Provincial Summary**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	235	236	95	36	95	95	94	I.D.
	average	0.08	0.37	0.16	0.44	20.7	25.4	53.5	
	range	0.01-0.29	0.20-0.52	0.05-0.37	0.30-0.70	1.0-108.0	2.0-110.0	21.0-122.0	
	S.D.	±0.05	±0.07	±0.04	±0.10	±25.4	±15.7	±19.6	
Oat									
	no. samples	149	150	53	18	53	53	51	I.D.
	average	0.09	0.33	0.13	0.43	13.7	50.5	38.8	
	range	0.01-0.22	0.18-0.59	0.09-0.19	0.29-0.55	2.0-49.0	8.0-113.0	17.0-82.0	
	S.D.	±0.03	±0.06	±0.02	±0.08	±13.2	±26.2	±11.1	
Wheat									
	no. samples	24	24	29	8	27	29	29	I.D.
	average	0.08	0.38	0.16	0.39	9.1	93.0	67.5	
	range	0.02-0.19	0.25-0.56	0.05-0.27	0.31-0.48	3.0-27.0	24.0-252.0	21.0-150.0	
	S.D.	±0.05	±0.08	±0.05	±0.07	±5.9	±66.1	±41.5	

TABLE 37 AVERAGE MINERAL ANALYSIS **Vancouver Island**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								
Oat									
	no. samples	7	7	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.08	0.29						
	range	0.04-0.13	0.18-0.34						
	S.D.	±0.03	±0.06						
Wheat									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 38 AVERAGE MINERAL ANALYSIS **Fraser Valley**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	30	30	9	I.D.	9	9	9	I.D.
	average	0.07	0.38	0.16		37.4	26.1	70.3	
	range	0.01-0.29	0.29-0.50	0.09-0.20		4.0-97.0	2.0-50.0	39.0-122.0	
	S.D.	±0.05	±0.06	±0.04		±33.9	±16.3	±29.6	
Oat									
	no. samples	13	14	I.D.	I.D.	I.D	I.D.	I.D.	I.D.
	average	0.08	0.36						
	range	0.04-0.13	0.28-0.47						
	S.D.	±0.03	±0.08						
Wheat									
	no. samples	I.D.	I.D.	12	I.D.	10	12	12	I.D.
	average			0.18		13.9	150.7	104.1	
	range			0.13-0.21		6.0-27.0	52.0-252.0	36.0-150.0	
	S.D.			±0.03		±7.2	±65.0	±42.2	

TABLE 39 AVERAGE MINERAL ANALYSIS **Kamloops-Okanagan**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	6	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.12							
	range	0.03-0.29							
	S.D.	±0.09							
Oat									
	no. samples	11	11	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.09	0.37						
	range	0.04-0.17	0.26-0.59						
	S.D.	±0.03	±0.09						
Wheat									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 40 AVERAGE MINERAL ANALYSIS Kootenay

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	46	48	21	11	21	21	20	I.D.
	average	0.09	0.36	0.15	0.54	11.9	18.9	45.2	
	range	0.02-0.21	0.27-0.47	0.05-0.37	0.40-0.70	4.0-48.0	10.0-51.0	31.0-72.0	
	S.D.	±0.04	±0.05	±0.06	±0.09	±11.9	±10.0	±10.5	
Oat									
	no. samples	21	22	15	6	15	15	14	I.D.
	average	0.10	0.34	0.13	0.46	10.1	26.3	36.6	
	range	0.04-0.19	0.19-0.44	0.09-0.18	0.29-0.55	3.0-45.0	8.0-53.0	21.0-49.0	
	S.D.	±0.03	±0.06	±0.02	±0.11	±12.7	±12.5	±8.5	
Wheat									
	no. samples	13	12	6	I.D.	6	6	6	I.D.
	average	0.09	0.38	0.14		7.3	44.8	44.5	
	range	0.03-0.19	0.28-0.53	0.05-0.27		5.0-11.0	24.0-100.0	31.0-56.0	
	S.D.	±0.05	±0.08	±0.08		±2.3	±27.9	±8.4	

TABLE 41 AVERAGE MINERAL ANALYSIS **Central Interior**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	53	55	20	12	20	20	20	I.D.
	average	0.08	0.38	0.15	0.43	12.3	25.9	51.1	
	range	0.03-0.29	0.22-0.49	0.10-0.27	0.34-0.59	4.0-59.0	14.0-70.0	34.0-108.0	
	S.D.	±0.04	±0.11	±0.04	±0.09	±13.7	±13.3	±17.3	
Oat									
	no. samples	24	23	10	6	10	10	10	I.D.
	average	0.09	0.33	0.13	0.41	10.5	55.4	40.6	
	range	0.04-0.22	0.25-0.42	0.11-0.14	0.32-0.48	4.0-30.0	27.0-98.0	30.0-48.0	
	S.D.	±0.04	±0.04	±0.01	±0.07	±9.1	±22.9	±6.4	
Wheat									
	no. samples	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average								
	range								
	S.D.								

TABLE 42 AVERAGE MINERAL ANALYSIS **Peace River**

GRAIN		Calcium %	Phosphorus %	Magnesium %	Potassium %	Copper ppm	Manganese ppm	Zinc ppm	Selenium ppm
Barley									
	no. samples	95	93	36	90	36	36	36	I.D.
	average	0.08	0.36	0.16	0.37	24.2	26.4	58.0	
	range	0.01-0.28	0.20-0.52	0.12-0.23	0.30-0.48	1.0-108.0	5.0-86.0	21.0-116.0	
	S.D.	±0.05	±0.06	±0.03	±0.07	±30.9	±14.6	±19.0	
Oat									
	no. samples	73	73	23	I.D.	23	23	22	I.D.
	average	0.09	0.31	0.13		15.9	58.5	38.2	
	range	0.01-0.22	0.22-0.40	0.11-0.17		2.0-49.0	27.0-113.0	26.0-57.0	
	S.D.	±0.03	±0.04	±0.02		±13.5	±24.8	±9.1	
Wheat									
	no. samples	11	12	I.D.	I.D.	I.D.	I.D.	I.D.	I.D.
	average	0.07	0.38						
	range	0.02-0.16	0.25-0.56						
	S.D.	±0.04	±0.08						

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